STUDIES ON MARINE BRYOZOA. VIII. EXOCHELLA LONGIROSTRIS JULLIEN 1888

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The purpose of this study is to report *Exochella longirostris* Jullien 1888 (order Cheilostomata, Family Exochellidae) from the Antarctic, to raise some questions about its synonymy and to add further morphological and ecological data to the limited information existing on this species.

Exochella longirostris Jullien 1888

(Figures 1 A–J)

Synonymy and distribution data:

1888. *Exochella longirostris.* Jullien pp. 55–56, Pl. 3, Figs. 1–4; Pl. 9, Fig. 2. From Ile Hoste, baie Orange, Canal du Beagle, Ile Gable, Tierra del Fuego. 19 meters.

1904. *E. longirostris.* Calvet p. 29. Magellan Straits, Punta Arenas.

1908. *E. longirostris.* Canu p. 300, Pl. VI, Fig. 13. From Post-Pampeen de Punta Borja, Puerto Militar, Bahia Blanca (Argentina).

1937. *E. longirostris.* Marcus pp. 82–83; Pl. 17, Fig. 43. Bay of Santos, Brazil; 20 meters.

1941. *E. longirostris.* Marcus p. 22; Fig. 16. Sta. Catharina, Parana; Guaratuba.

1949. *E. longirostris.* Marcus p. 1. South of Victoria, Espirito Santo, Lat. 20°33'S., Long. 40°14'W.; 35 meters.

1952. *E. longirostris.* Mawatari p. 265. Wakayama Prefecture, Shirahama and Tonda, Japan.

Some difficulty was encountered in the identification of this species because Jullien's original description was inadequate. Externally, the USNM specimens resemble those pictured by Jullien (1888) and Canu (1908) but these authors did not figure the internal aspect of the primary orifice, a very important diagnostic character. Levinsen (1909, p. 321; Pl. 17, Figs. 6a–c) beautifully and completely described an *Exochella longirostris* from Challenger Sta. 315, Falkland Islands. However, it is not at all certain that Levinsen and Jullien were describing the same species. Levinsen pictured a distinct lyrula on the proximal border of the primary

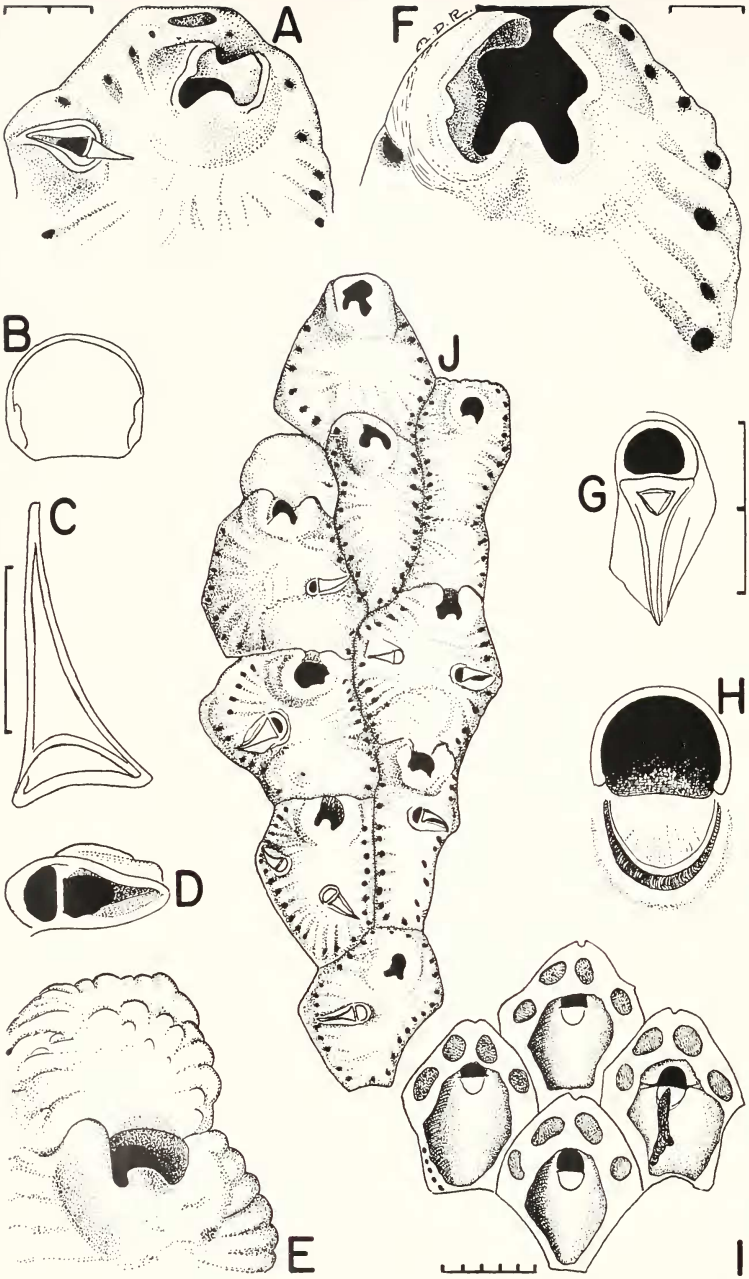

FIGURE 1, *A–J*.

orifice, while Jullien stated that the orifice is rounded and that its peristome is prolonged forward and backward. The USNM specimens do not show such a prominent structure so immediately within the primary orifice but do show the peristome thickened medially to simulate a lyrula a little in front of the primary orifice border. Waters's notations on this species (1889 *E. longirostris* and 1906 *Smittia longirostris*) are not precise enough for one to be able to determine if he actually had Jullien's species, so are not included in the present synonymy. Marcus' Bay of Santos specimens are considerably smaller in all parts (zooecia, apertures, ovicells, avicularia) than the USNM specimens, judging from the scale accompanying Marcus' Pl. 17, Fig. 43. His avicularia seem much thinner than those of the present specimens. Finally, the peristomial processes appear to be thinner and sharper than those of the USNM material. In spite of these differences, it is believed that these belong to the same species and that the differences are due to ecological and geographical factors, the USNM Antarctic specimens showing the sturdiest and largest specimens of this variable form.

Diagnosis: Zoarium encrusting, heavily calcified. Zooecial boundaries distinct. Convex frontal an areolate pleurocyst, somewhat ribbed in old zoids. Ovicells nonporous, covered over by the frontal of the next distal zoid. Avicularia adventitious, pointed, medium-sized, frontal, not peripheral nor over an areolar pore; one, two or none may occur on a zoid. Mandible long, triangular, sharply pointed. Peristome incomplete distally in ovicelled zoids. Raised peristome develops a mucro, sometimes medially thickened to simulate a lyrula. Peristomial sinus on each side of the mucro. Peristomial side walls raised, sometimes pressing inward. Primary orifice has a hemispherical vestibular arch. Immediate lyrula and cardelles absent.

All figures are drawn with the aid of a camera lucida.

FIGURE 1. *Exochella longirostris* Jullien 1888, from the Antarctic.

A. A zooecium at growing edge of colony. Thin young peristome still incomplete in back, with two sinuses and a lip-like mucro proximally. Mandible opened. One dietella (broad distal pore) shown at top. Drawn to the 0.2 mm. scale above.

B. Operculum, drawn to the Figure G scale.

C. Mandible, drawn to the 0.1 mm. scale at left.

D. Avicularium with membranous part burned off. Drawn to the Figure G scale.

E. An old ovicelled zooecium. The very thick peristome is worn away in front and at right. The projection simulating a lyrula is not a true lyrula but a thickened "core" of the mucro, a thickening of the proximal peristomial wall and characteristic of the most heavily calcified zooecia. Drawn to the Figure A scale.

F. Another young incomplete peristome. The mucro is more pointed and the side walls press in more acutely than in Figure A. Drawn to the 0.1 mm. scale above.

G. An avicularium with mandible in place. Membranous "back" area in black. Drawn to the 0.2 mm. scale at right.

H. The primary orifice in black, vestibular arch above, and compensation sac area below, as seen from inside the zooecium. Drawn to the Figure F scale.

I. Four zooecia seen from the attached basal side. Each has four dietellae (large heavily stippled distal pores). Five small areolar pores are on the lower corner of the left zoid whose basal wall has broken away there. The zooecium at right has the remains of the operculum and tentacular sheath suspended from the orifice. Compensation sac area also plainly visible in all. Drawn to the 0.5 mm. scale below.

J. Nine old zooecia. The upper three and the lowest one are non-ovicelled. The remaining five have non-porous ovicells more or less undistinguishable from the frontal of their distal zooecia. They can be recognized by the incomplete distal wall of the peristome. One, two or no avicularia may be present per zooecium. They are not areolar but are more central in location. Drawn to the Figure I scale.

Operculum forms three fourths of a circle, with proximal edge bevelled. Compensation sac about the size of the primary orifice. Three to five dietellae.

Measurements. The first figures are the minimum, the next the maximum and the last, in parentheses, the average of 10 readings for each structure (except for the avicularia whose averages are based on 30 readings). Length and width are abbreviated to L and W. Readings are in millimeters.

0.734–0.979	(0.888)	Zooecia L
0.605–0.922	(0.736)	Zooecia W
0.158–0.259	(0.204)	Avicularia L
0.072–0.130	(0.102)	Avicularia W
0.115–0.147	(0.131)	Primary orifice L
0.144–0.166	(0.155)	Primary orifice W
0.144–0.173	(0.153)	Secondary orifice L, including sinus
0.101–0.144	(0.124)	Secondary orifice L, exclusive of sinus
0.144–0.173	(0.153)	Secondary orifice W
0.302–0.360	(0.334)	Ovicell L
0.360–0.418	(0.382)	Ovicell W
0.137–0.158	(0.147)	Operculum L
0.130–0.173	(0.154)	Operculum W
0.128–0.151	(0.137)	Mandible L
0.058–0.073	(0.068)	Mandible W
0.115–0.158	(0.130)	Compensation sac area L
0.122–0.158	(0.143)	Compensation sac area W

Zoarium. The ivory-colored, heavily calcified zoarium is sturdy and sometimes extensive. A 25 × 36-mm. pebble had one surface completely encrusted by one colony. Colonies are unilaminate, forming a thick crust, usually numbering many zoids. Polypide remains present in some.

Zooecia. The hexagonal zooecia are distinct and sizable. Some are ovicelled, some not; some have avicularia, others do not. From the basal aspect (Fig. 1, I), the three distal walls are convex, the three proximal walls concave. The thick frontal is a granular to beaded pleurocyst. Ridges arise between its closely spaced elliptical areolar pores and continue part way up the frontal (Fig. 1, F, J). The compensation sac area is small and immediately below the orifice (Fig. 1, H, I). The basal, attached zooecial surface has 3 to 5, usually 4, large oval dietellae (Fig. 1, I).

Avicularia. One or two frontal avicularia occur on many of the zoids. Their orientation is variable on the solid part of the frontal. They are not oral nor areolar though some occur fairly close to the zooecial edge. Others are more central (Fig. 1, J). The small avicularial chamber tips the beak upward along a modest slope. The avicularia are always of the same type and of fairly uniform size. Their back area is hemispherical, the beak triangular and longer. The mandible is a narrow triangle, with the two long sides concave (Fig. 1, C, G), and edges reinforced. The USNM avicularia, though larger in actual measurements than those of Marcus' species, are smaller in proportion to the rest of the zooecial front than are Marcus' specimens.

Orifice. The orifice is not terminal but a slight distance short of that. Its

distal wall is not formed by the next distal zoid. The deeply set primary orifice is slightly more than hemispherical, with a handsome vestibular arch and a nearly straight proximal border (Fig. 1, H). The chitin-rimmed operculum has the same shape (Fig. 1, B). Lyrula and cardelles are absent in the primary orifice but the peristome immediately in front of the operculum simulates a lyrula. This appears to be at variance with Levinsen's figures which show a lyrula apparently right on the border of the primary aperture. Whether or not this is the condition of Jullien's original material is unknown. The secondary orifice shape is variable, depending on the degree of calcification, being sometimes trifoliate, sometimes horseshoe-shaped (Fig. 1, E, F, J). The distal peristome wall is entire in mature non-ovicelled zoids but interrupted by the ovicell in fertile ones. The peristome thickens considerably with age. Proximally the peristome develops a tab-like mucro (Figs. A, F) bordered on each side by a sinus. The mucro may thicken medially to such an extent inward that it could be easily mistaken for a lyrula (Fig. 1, E). Laterally, the peristomial wall may or may not pinch in (Fig. 1, F).

Ovicells. Young ovicells are salient, old ones heavily calcified and immersed. They are not porous but some are bordered laterally by a few areolar pores which do not penetrate the ovicell wall proper. The ovicell surface is granular to beaded, occasionally irregularly ridged (Fig. 1, E). No avicularia occur on the ovicells nor does the peristome encroach upon them but the frontal of the next distal zoid covers the ovicell front completely.

Distribution and ecology. This species' most northerly record (and the only one for the northern hemisphere) is that of Mawatari (1952) from Japan. All other previous records are from the southern hemisphere, ranging from 20°33'S. Lat. (Marcus, 1949, south of Victoria, Brazil) to about 55°40'S. Lat. (Jullien, 1888, Tierra del Fuego, Ile Hoste).

The USNM specimens appeared on a rock from Sta. 184 and on pebbles Nos. 2, 3, 4, 12, 13 and 16 from an unidentified Antarctic locality (Comdr. D. C. Nutt, U. S. Navy's 1947–48 Antarctic Expedition). Station 184 was at Marguerite Bay, Antarctica, location approximately 68°30'W. Long. and 68°30'S. Lat., bottom dredge haul, depth 85–100 fathoms, water temperature 30.2° F., Feb. 19, 1948. This represents the most southerly and deepest record for the species and the first time it was collected well within the Antarctic Circle. Some of the USNM colonies have grown over Foraminifera, incorporating their shells within the zooecial base. Sponge spicules are matted over one colony, calcareous worm tubes and occasional bryozoan zoids (of other species) are present on other colonies. However, most of the colony surface is free of extraneous growths. The Antarctic specimens appear to be much larger, thicker-walled and more sturdy than those from warmer localities. The present study specimens are on deposit at the U. S. Nat. Museum, Smithsonian Institution, Cat. Nos. 11325, 11326, 11327 and 11328.

Affinities. *Exochella longirostris* Jullien 1888 and a fossil species *E. grandis* Canu and Bassler (1935, p. 32, Pl. 9, Fig. 3) from the Tertiary Balcombian Beds of Muddy Creek, Victoria, Australia, appear to be closely related. The USNM specimens are similar in size and measurements to *E. grandis* but lack the prominent mural thread and the very conspicuous beading of the pleurocyst. In *E. grandis* the avicularia replace the areolar pores but in the USNM *E. longirostris* they generally do not and are less peripheral.

Summary

1. The geographic range of *Exochella longirostris* is extended to the Antarctic.

2. The Antarctic specimens are sturdier, larger and thicker-walled than those of the same species from warmer waters and have avicularia which are a bit smaller proportionately, although larger in actual measurements.

3. Numerous measurements of various structures and zooecia are included, to show the range of variation for this species.

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